

## PRANDTL-D Sub-Scale Glider

Completed Technology Project (2011 - 2013)



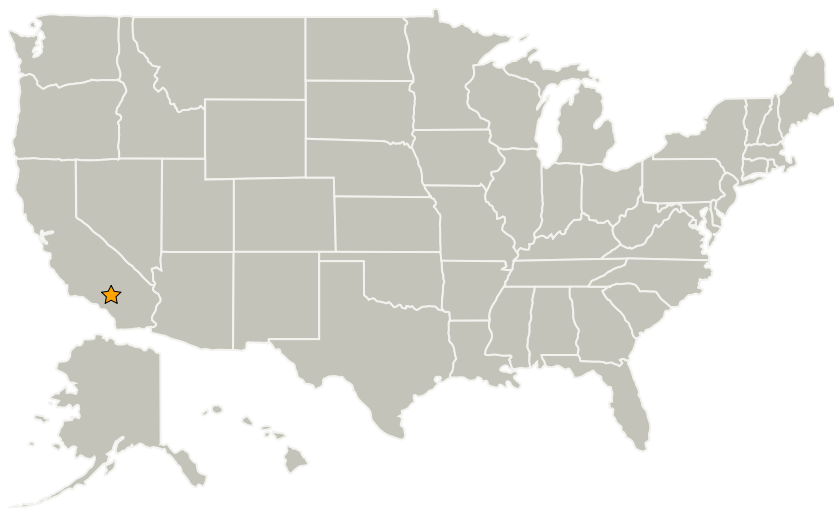
## Project Introduction

Dryden researchers are experimenting with a new wing shape that could significantly increase aircraft efficiency. The team has built upon the research of the German engineer Ludwig Prandtl to design and validate a scale model of a non-elliptical wing that reduces drag and increases efficiency. The approach to handling adverse yaw employs fine wing adjustments rather than an aircraft's vertical tail. The Preliminary Research Aerodynamic Design to Lower Drag (PRANDTL-D) wing addresses integrated bending moments and lift to achieve an 11 percent drag reduction. In a propeller application, efficiency could increase by 13 percent. Work to date: In 2013, the team developed, demonstrated, and validated a scale model of an improved PRANDTL-D wing. Initial results from a 4-month, small-scale flight experiment unequivocally established proverse yaw. Additionally, preliminary results of the parameter estimation show the correct sign and comparable magnitude to the analysis. Looking ahead: Next steps are to build and test a propeller with the PRANDTL-D configuration. Benefits Highly efficient: Increases total aircraft efficiency by as much as 62 percent, including efficiency increases in the areas of wing (12.5 percent), drag reduction (25 percent), and use in propulsion systems (13 percent) Quieter: Decreases noise Faster: Allows aircraft to fly faster Applications Aircraft Turbines Energy delivery systems

## Anticipated Benefits

N/A

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Armstrong Flight Research Center (AFRC)

**Responsible Program:**

Center Innovation Fund: AFRC CIF

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Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California
University of Michigan-Ann Arbor	Supporting Organization	Academia	Ann Arbor, Michigan

Co-Funding Partners	Type	Location
University of Michigan-Ann Arbor	Academia	Ann Arbor, Michigan

## Stories

Prandtl Mars Aircraft  
(<https://techport.nasa.gov/file/24251>)

PRANDTL Success Story  
(<https://techport.nasa.gov/file/22080>)

## Project Management

**Program Director:**

Michael R Lapointe

**Program Manager:**

David F Voracek

**Project Manager:**

Albion H Bowers

**Principal Investigator:**

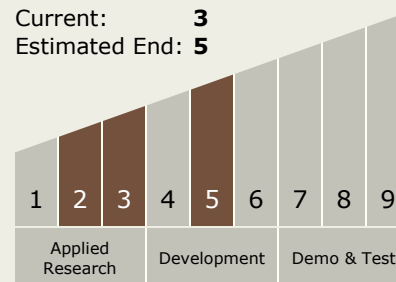
Oscar J Murillo

**Co-Investigators:**

Brian S Eslinger  
Ross W Hathaway  
Albion H Bowers

## Technology Maturity (TRL)

Start: 2  
Current: 3  
Estimated End: 5



## Technology Areas

**Primary:**

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.6 Advanced Atmospheric Flight Vehicles